AEROLOGICAL OBSERVATIONS

[The Aerological Division, W. R. GREGG, in charge]

By L. T. SAMUELS

Free-air temperatures during the month averaged decidedly above normal over the Missouri Valley and slightly above over central Texas and the eastern Gulf region. The departures were mostly negative, of moderate magnitude, over the middle Atlantic coast, lower Lake region and southern California. Relative humidity departures were mostly of opposite sign to those of temperatures, pronounced exceptions occurring over the middle Atlantic coast where both elements averaged below normal and over the Missouri Valley where positive departures occurred in both temperature and relative humidity.

The greatest variation from normal at the 1,000-meter level occurred over the Missouri Valley where a pronounced southerly component obtained as compared to a normal west-northwesterly one and over the upper Lakes region where the winds were more northerly than normal. At higher levels the resultant velocities were generally greater than normal with practically normal directions.

Airplane flights were made on every day during the month with one exception at Cleveland. The mean heights reached ranged from 4.942 meters at Cleveland, to 5,756 meters at Omaha. The highest single flight was 6,406 meters at Omaha.

TABLE 1.—*Free-air temperatures and relative humidities during April, 1932*

TEMPERATURE (° C.)

Altitude (meters) m. s. l.	Chicago, Ill. (190 meters) [1]		Cleveland, Ohio (245 meters) [1]		Dallas, Tex. (149 meters) [2]		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Hampton Roads, Va. (2 meters) [3]		Omaha, Nebr. (299 meters) [4]		Pensacola, Fla. (2 meters) [3]		San Diego, Calif. (9 meters) [3]		Washington, D. C. (2 meters) [3]	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	5.0	−5.4	2.6	−7.8	14.8	−2.3	14.6	−1.5	7.8	+2.2	10.7	−1.0	8.2	−1.0	17.3	−0.4	16.0	−1.0	8.1	−3.3
500	5.9	−2.2	3.4	−4.7	16.0	+0.9	13.3	−0.8	7.2	+2.0	9.0	−2.4	8.8	+0.3	16.5	+0.1	13.6	−0.3	7.4	−1.5
1,000	5.4	−0.4	3.3	−2.5	15.5	+2.2	11.0	−0.4	4.2	+1.5	6.8	−2.3	9.4	+3.8	14.5	+0.2	12.9	0.0	5.9	−0.7
1,500	4.2	+0.7	1.6	−1.9	13.7	+1.9	8.1	−0.5	2.9	+2.4	------	------	7.8	+4.2	------	------	------	------	------	------
2,000	2.3	+1.1	−0.1	−1.3	11.6	+2.0	5.7	−0.1	0.9	+3.0	2.5	−1.9	5.6	+4.3	10.7	+0.8	8.1	−1.3	2.3	−1.4
2,500	−0.6	+0.7	−2.0	−0.7	8.7	+1.8	2.8	−0.6	−1.6	+3.3	------	------	3.1	+4.4	------	------	------	------	------	------
3,000	−3.4	+0.4	−4.6	−0.8	5.3	+1.4	−0.2	−0.9	−4.2	+3.7	−0.9	−0.3	0.3	+4.4	5.6	+1.0	1.8	−1.3	−0.9	−2.3
4,000	−9.7	−0.7	−10.1	−1.1	−2.3	+0.1	−6.2	−1.6	−11.4	+2.6	------	------	−6.5	+3.7	------	------	------	------	−5.9	−2.0
5,000	−16.6	−2.0	−17.0	−2.4	−10.0	−1.8	------	------	------	------	------	------	−14.2	+1.9	------	------	------	------	------	------

RELATIVE HUMIDITY (PER CENT)

Surface	75	+10	82	+17	75	−2	64	+1	71	+6	66	+1	76	+11	78	0	69	+1	64	+3
500	69	+4	76	+11	68	−2	60	−2	72	+8	61	+6	72	+8	70	+1	70	−4	58	0
1,000	60	−2	69	+ 7	60	−1	55	−5	73	+13	56	+6	64	+2	66	+5	57	−4	54	−2
1,500	52	−8	66	+6	55	+7	52	−7	68	+11	------	------	61	+2	------	------	------	------	------	------
2,000	47	−11	61	+3	46	+3	49	−7	64	+9	55	+9	59	+2	53	+4	40	+3	50	−5
2,500	48	−6	56	+2	41	0	47	−5	63	+9	------	------	57	0	------	------	------	------	------	------
3,000	45	−6	52	+1	39	0	42	−8	59	+5	50	+8	55	−1	47	+6	34	+7	34	−14
4,000	43	−5	46	−2	40	−2	44	−4	48	−8	------	------	53	−2	------	------	------	------	32	−15
5,000	44	−3	44	−3	37	−1	------	------	------	------	------	------	53	+1	------	------	------	------	------	------

[1] Normals for Royal Center Ind. used.
[2] Normals determined by interpolating between those for Groesbeck, Texas and Broken Arrow, Okla.
[3] Naval air stations.
[4] Normal for Drexel, Nebr. used.

TABLE 2.—*Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a. m. (E. S. T.) during April, 1932*

[Wind from North=360°; East=90°; etc.]

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,528 meters)		Bismarck, N. Dak. (518 meters)		Brownsville, Tex. (12 meters)		Burlington Vt. (132 meters)		Cheyenne, Wyo. (1,873 meters)		Chicago, Ill. (198 meters)		Cleveland Ohio (245 meters)		Dallas, Tex. (154 meters)		Due West, S. C. (217 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (14 meters)		Key West, Fla. (11 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	45	4.4	65	1.9	143	2.8	253	1.1	310	4.3	41	0.7	256	0.5	170	2.1	317	0.6	250	2.7	290	0.7	66	1.9
500	------	------	------	------	150	7.1	269	3.3	------	------	76	1.7	23	1.2	201	6.4	247	1.8	------	------	292	2.2	95	3.7
1,000	------	------	131	2.3	167	5.5	294	4.5	------	------	354	2.0	321	3.7	225	5.7	266	3.9	260	4.6	282	2.6	101	3.1
1,500	------	------	169	2.2	209	2.0	292	5.8	------	------	319	3.2	317	6.1	242	4.4	277	5.2	280	5.6	272	3.9	71	1.5
2,000	286	2.7	267	2.6	260	0.9	312	10.1	298	5.8	299	5.3	307	8.7	267	5.2	286	7.0	284	5.6	281	3.7	45	1.0
2,500	288	5.2	317	6.8	223	0.3	310	9.2	288	8.1	285	4.1	311	10.2	286	5.1	292	7.4	258	5.6	316	5.5	341	0.6
3,000	290	8.3	317	8.4	331	1.7	322	13.3	289	7.9	------	------	304	10.6	297	6.1	298	9.6	258	5.1	319	6.8	310	3.4
4,000	272	9.8	307	6.4	------	------	------	------	287	9.8	------	------	306	12.3	292	6.5	313	8.5	216	6.5	316	7.1	311	3.8
5,000	280	9.9	------	------	------	------	------	------	293	10.7	------	------	311	10.6	289	5.7	292	7.9	------	------	293	7.7	301	6.1

TABLE 2.—*Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a. m. (E. S. T.) during April, 1932*—Continued

Altitude (meters) m. s. l.	Los Angeles, Calif. (217 meters)		Medford, Oreg. (410 meters)		Memphis, Tenn. (85 meters		New Orleans, La. (25 meters)		Oakland, Calif. (8 meters)		Oklahoma City, Okla. (397 meters)		Omaha, Nebr. (299 meters)		Phoenix, Ariz. (356 meters)		Salt Lake City, Utah (1,294 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (14 meters)		Washington, D. C. (10 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	309	0.2	248	0.4	161	0.5	98	0.4	342	0.8	184	1.6	104	2.0	100	2.0	170	1.6	30	1.1	172	1.2	291	1.4
500	135	0.6	268	1.0	208	3.9	173	2.1	293	2.7	191	3.2	129	2.9	126	1.4	-----	------	42	2.9	196	3.0	294	4.4
1,000	331	2.0	255	1.3	238	4.7	194	2.9	307	3.6	233	5.3	176	3.4	282	2.1	-----	------	14	3.2	200	3.9	293	6.3
1,500	300	2.8	214	2.8	250	4.7	207	2.2	287	3.8	255	5.3	246	3.7	263	2.3	178	2.4	345	4.8	205	4.7	295	9.7
2,000	297	3.4	227	4.9	268	4.9	243	1.6	276	4.5	271	5.5	271	4.8	253	3.5	203	2.2	341	7.6	209	4.9	305	12.4
2,500	293	3.3	230	7.0	273	7.4	303	3.0	256	5.1	270	6.8	284	5.4	231	4.4	247	2.5	332	9.8	210	5.0	301	11.5
3,000	283	5.2	225	8.5	274	9.5	288	3.8	260	5.4	287	5.9	292	9.9	233	6.1	267	5.0	329	9.4	207	6.0	303	11.3
4,000	274	7.0	223	9.9	-----	------	309	7.5	266	6.1	-----	------	292	13.1	255	8.0	276	7.0	306	9.6	-----	------	283	12.3
5,000	-----	------	-----	------	-----	------	-----	------	-----	------	-----	------	-----	------	-----	------	279	5.2	318	13.3	-----	------	-----	------

WEATHER IN THE UNITED STATES

THE WEATHER ELEMENTS

By M. C. BENNETT

GENERAL SUMMARY

The temperature during April was somewhat below the normal from the middle Atlantic area and upper Ohio Valley northward and in the central and southern Plateau and Pacific regions. Elsewhere it was generally above the seasonal average, being but slightly above in the Southern States, while from northern Texas and Arkansas northward to the Canadian border it averaged from 2° to 4° above.

The month as a whole was generally drier than usual throughout the greater part of the country, except the northern Great Plains, the central Rocky Mountain States and the northern half of the Pacific area. The marked feature of the April precipitation was the receipt of generous amounts in the Northwestern States, where moisture had been deficient for a long time, some portions of Montana and the Dakotas receiving nearly 300 per cent of the average April rainfall. The central valleys, the East, and South received generally less than normal; however, heavy amounts were received in limited areas along the west Gulf coast. On the other hand a number of stations in the far Southwest received no rainfall during the entire month.

TEMPERATURE

Periods of low temperature and of high were scattered through the month, most of them being quite brief. In general, the first decade brought more warm weather than cool, and the Missouri Valley was almost constantly warmer than normal. California, the Ohio Valley, and the southern Appalachian region likewise were mainly warm, while in the southern Rocky Mountain region and several parts of the Gulf and Lake regions cool weather predominated.

The middle decade was mainly warmer than normal in the western half of the country, notably the Rocky Mountain region, the northern Plains and the southern Plateau. Low temperatures prevailed in much of the eastern half, especially the Lake region, Ohio Valley, and districts to eastward.

The first half of the last decade was mainly cool from the Rocky Mountains westward, but warm to eastward, particularly in the lower Mississippi Valley and East Gulf States. The latter half of the decade differed from the first half chiefly between the Rocky Mountains and the Mississippi River, where cool weather set in.

In the northeastern portion of the country April resembled March, each averaging colder than normal; in California and adjoining districts a cool April followed a mild March, while in most other regions, a warm April succeeded a cold March.

April was the first month since August, 1931, to average within 4° of normal in every State. The Plains region, Montana, and parts of the lower Mississippi Valley averaged from 2° to 4° warmer than normal. Most of the far Northwest, Utah, the Rocky Mountain and Gulf States, Tennessee, Kentucky, and the upper Mississippi Valley were slightly warmer than normal.

There were small deficiencies in California, most of Nevada, and parts of States adjoining; also the South Atlantic States and the upper Ohio Valley averaged a little cooler than normal. The Lake region and the extreme Northeast averaged considerably below normal, much of New York being 3° or more below.

The highest marks were usually in the eighties in the northernmost States, the Ohio Valley, and the Middle Atlantic States, but elsewhere from 90° to 105°, the last in Arizona. As a rule they occurred during the middle decade between the Pacific coast and the Plains, and during the last decade to eastward.

The lowest readings were below zero in a few North-Central States and some States with lofty mountains; but from the middle and southern Plains eastward they were mostly between 15° and 35°. In the eastern half these lowest readings occurred usually during the first five days or else about the 13th; in the western half the dates were various, but the Rocky Mountain and the middle Plateau States recorded their coldest weather about the 7th.

PRECIPITATION

The north-central portion of the country received a large part of the April precipitation during the opening week and the northeastern portion during the first two weeks. In the far Northwest most of the month's precipitation came during the period from 13th to 22d. To many parts of the country, however, it was the final decade that brought precipitation most abundantly, notably to the Dakotas, the northern and middle Rocky Mountain States, Texas and thence eastward and northeastward to the southern Appalachians and the lower and middle Ohio Valley.

The precipitation of April averaged less than normal in about three-fourths of the States, while in none was it